Anna C. Schapiro

aschapir@sas.upenn.edu | schapirolab.org

Employment

2019 –	Assistant Professor, Department of Psychology, University of Pennsylvania
2015 – 2019	Postdoctoral Fellow Center for Sleep and Cognition, Harvard Medical School, P.I. Robert Stickgold

Education

2014	Princeton University – Ph.D. in Psychology and Neuroscience.
2009	Stanford University – B.S. in Symbolic Systems, departmental honors, with distinction. Concentration in neuroscience.

Awards and honors

2018	Sleep Research Society Trainee Merit Award
2017	Inaugural Corkin Award, Memory Disorders Research Society
2016	Ruth L. Kirschstein National Research Service Award, Individual Postdoctoral Fellowship (NRSA F32), National Institute of Neurological Disorders and Stroke
2013	Letter of Commendation for Outstanding Teaching, Princeton University
2012	Rumelhart Memorial Travel Award, Neural Computation and Psychology Workshop, San Sebastian, Spain
2012	Summer Institute in Cognitive Neuroscience Fellow, Santa Barbara, CA
2010	National Science Foundation Graduate Research Fellowship
2009	Firestone Medal for Excellence in Undergraduate Research, Stanford University
2009	K. Jon Barwise Award for Distinguished Contributions to the Symbolic Systems Program, Stanford University
2009	Phi Beta Kappa, elected to Stanford chapter

Publications

Preprints

Schapiro, A.C., Reid, A.G., Morgan, A., Manoach, D.S., Verfaellie, M., & Stickgold, R. (submitted). The hippocampus is necessary for the sleep-dependent consolidation of a task that does not require the hippocampus for initial learning. bioRxiv: https://doi.org/10.1101/451195.

Peer-reviewed

Cox, R., Van Bronkhorst, M.L.V., Bayda, M., Gomillion, H., Cho, E., Parr, E., Manickas-Hill, O.P., **Schapiro, A.C.**, & Stickgold, R. (2018). Sleep selectively stabilizes contextual aspects of negative memories. *Scientific Reports.*

Schapiro, A.C., McDevitt, E.A., Rogers, T.T., Mednick, S.C., & Norman, K.A. (2018). Human hippocampal replay during rest prioritizes weakly-learned information and predicts memory performance. *Nature Communications.*

Cox, R., **Schapiro, A.C.,** & Stickgold, R. (2018). Variability and stability of large-scale cortical oscillation patterns. *Network Neuroscience.*

Honey, C.J., Newman, E.L., & **Schapiro, A.C.** (2017). Switching between internal and external modes: a multi-scale learning principle. *Network Neuroscience.*

Schapiro, A.C.*, McDevitt, E.A.*, Chen, L., Norman, K.A., Mednick, S.C., & Rogers, T.T. (2017). Sleep benefits memory for semantic category structure while preserving exemplar-specific information. *Scientific Reports.*

Cox, R., **Schapiro, A.C.,** Manoach, D.S., & Stickgold, R. (2017). Individual differences in frequency and topography of slow and fast sleep spindles. *Frontiers in Human Neuroscience.*

Schapiro, A.C., Turk-Browne, N.B., Botvinick, M.M., & Norman, K.A. (2017). Complementary learning systems within the hippocampus: A neural network modeling approach to reconciling episodic memory with statistical learning. *Philosophical Transactions of the Royal Society B.*

Schapiro, A.C., Turk-Browne, N.B., Norman, K.A., & Botvinick, M.M. (2016). Statistical learning of temporal community structure in the hippocampus. *Hippocampus.*

Schlichting, M.L., Guarino, K.F., **Schapiro, A.C.,** Turk-Browne, N.B., & Preston, A.R. (2016). Hippocampal structure predicts statistical learning and associative inference abilities during development. *Journal of Cognitive Neuroscience.*

Schapiro, A.C., Gregory, E., Landau, B., McCloskey, M., Turk-Browne, N.B. (2014). The necessity of the medial temporal lobe for statistical learning. *Journal of Cognitive Neuroscience.*

Schapiro, A.C., Rogers, T.T., Cordova, N.I., Turk-Browne, N.B., & Botvinick, M.M. (2013). Neural representations of events arise from temporal community structure. *Nature Neuroscience.*

Schapiro, A.C., McClelland, J.L., Welbourne, S.R., Rogers, T.T., & Lambon Ralph, M.A. (2013). Why bilateral damage is worse than unilateral damage to the brain. *Journal of Cognitive Neuroscience.*

Gershman, S.J., **Schapiro, A.C.,** Hupbach, A., Norman, K.A. (2013). Neural context reinstatement predicts memory misattribution. *Journal of Neuroscience.*

Schapiro, A.C., Kustner, L.V., & Turk-Browne, N.B. (2012). Shaping of object representations in the human medial temporal lobe based on temporal regularities. *Current Biology.*

Schapiro, A.C. & McClelland, J.L. (2009). A connectionist model of a continuous developmental transition in the balance scale task. *Cognition.*

Chapters

Schapiro A.C., & Turk-Browne N.B. (2015) Statistical Learning. In: Arthur W. Toga, editor. Brain Mapping: An Encyclopedic Reference. Academic Press: Elsevier. pp. 501-506.

Diuk, C., **Schapiro, A.C.**, Cordova, N.I., Ribas-Fernandes, J., Niv, Y., & Botvinick, M.M. (2013). Divide and conquer: Task decompositions and hierarchical reinforcement learning in humans. In *Computational and Robotic Models of the Hierarchical Organization of Behavior* (pp. 271-291). Springer Berlin Heidelberg.

Thomas, M.S.C., McClelland, J.L., Richardson, F.M., **Schapiro, A.C.**, & Baughman, F. (2009). Dynamical and Connectionist Approaches to Development: Toward a Future of Mutually Beneficial Co-evolution. In J.P. Spencer, M. S. C. Thomas, & J. L. McClelland, (Eds). *Toward a unified theory of development: Connectionism and dynamic systems theory re-considered.* New York: Oxford.

Invited colloquium and seminar talks

Bard College, *Bard Summer Research Institute*, July 2018

Brown University, *Providence Sleep Research Interest Group seminar*, May 2018

University of Iowa, *Iowa Neuroscience Institute seminar*, April 2018

Stanford University, *Department of Psychology colloquium,* November 2017

Harvard University, *Cognition, Brain, and Behavior seminar*, October 2017

Boston University, *Brain, Behavior, and Cognition seminar,* October 2017

Tufts University, *Cognitive and Brain Science colloquium,* October 2017

Brown University, *Cognition Seminar*, April 2017

UC San Diego, *Temporal Dynamics of Learning Center seminar*, March 2017

University College London, *Affective Brain Lab seminar*, October 2016

Weill Cornell Medical College, *Sackler Institute seminar*, April 2015

Invited symposium and workshop talks

Cognitive Computational Neuroscience, *What is systems consolidation for? Examining the potential utility of memory transformation for humans and artificial intelligence*, September 2018

Science of Understanding Workshop, Madison, WI, July 2018

Hungarian Academy of Sciences, *Hippocampal Network Across the Lifespan Symposium*, May 2018

Park City Winter Conference on the Neurobiology of Learning and Memory, *Representation of Contextual Spaces by Cortico-Hippocampal Networks*, January 2018

Haskins Laboratories, *McDonnell Foundation Workshop: The Future of Statistical Learning,* November 2017

COSYNE, *'Perception and Learning of Temporal Structure in Sensory Streams' workshop*, February 2017

UC Riverside, *Riverside Enhanced Memory & Sleep meeting*, November 2016

COSYNE, *'What Can Sleep Tell Us About Memory Consolidation' workshop*, March 2015

Teaching

2016	Co-instructor for *Conscious States: Waking, Sleeping, and Dreaming* (MBB 980A) at Harvard College
2015	Princeton Teaching Transcript Program https://www.princeton.edu/mcgraw/gs/transcript/
2012	Teaching Assistant for *Introduction to Connectionist Models: Bridging Between Brain and Mind* (PSY/NEU 330) at Princeton.
2007	Student Initiated Course on philosophy of mind at Stanford.

Professional activities, service, and advising

2018	Co-chair for Society for Neuroscience nanosymposium, *Animal Cognition and Behavior: Learning and Memory: Cortical-Hippocampal Interactions*
2016	Postdoctoral steering committee for Harvard's Mind Brain Behavior program
2013	Co-organizer of the first annual Manhattan Area Memory Meeting
2013	Graduate student committee for the neuroscience Ph.D. track at Princeton
2011	Organizing committee for Department of Psychology graduate student visiting day at Princeton
2010	Organizing committee for Department of Psychology graduate student orientation at Princeton
2007 – 2009	Advising Fellow for the Symbolic Systems Program at Stanford
2008	Chaired sessions at the PsyPAG annual conference, University of Manchester
2006 – 2008	Focus Assistant and Resident Assistant for the Symbolic Systems theme house at Stanford

Ad hoc reviewing for:

Cerebral Cortex

Cognition

Cognitive Psychology

Cognitive Science

Cortex

Current Biology

Cognitive Neuropsychology

eLife

Experimental Brain Research

Frontiers in Psychology

Hippocampus

Human Brain Mapping

Journal of Cognitive Neuroscience

Journal of Experimental Psychology: General

Journal of Experimental Psychology: Learning, Memory, and Cognition

Journal of Neuroscience

Learning and Memory

Learning and Motivation

Nature Communications

Nature Human Behaviour

Neuropsychologia

Open Mind

PLOS Computational Biology

Psychological Review

Psychonomic Bulletin and Review

Scientific Reports

Sleep

Trends in Cognitive Science

Undergraduate advisees:

Olivia Manickas-Hill (Harvard '18)

Daniel Toker (Princeton '13)

Kaitlin Henderson (Princeton '12)

Aaron Trippe (Princeton '12)

Omoshalewa Bamkole (Princeton '11)

Lauren Kustner (Princeton '11)

Research training

2009 – 2015	Graduate Student Computational Memory Lab, Princeton University, P.I. Ken Norman Botvinick Lab, Princeton University, P.I. Matt Botvinick Turk-Browne Lab, Princeton University, P.I. Nick Turk-Browne
2006 – 2009	Research Assistant PDP Lab, Stanford University, P.I. Jay McClelland
2008	Summer Research Assistant Neuroscience and Aphasia Research Unit, University of Manchester, P.I. Matthew Lambon Ralph
2006	Summer Research Assistant Computational Cognitive Science Group, MIT, P.I. Josh Tenenbaum TedLab, MIT, P.I. Ted Gibson

Conference talks

Schapiro, A.C. (2018, November). Enhancement and forgetting of semantic memories across offline periods. *Talk delivered at the Society for Neuroscience Meeting minisymposium, San Diego.*

Schapiro, A.C. (2018, April). Enhancement and prioritization of structured information over sleep and wake. *Talk delivered at the International Conference on Learning and Memory.*

Schapiro, A.C., Turk-Browne, N.B., Botvinick, M.M., & Norman, K.A. (2017, June). Complementary learning systems within the hippocampus: reconciling episodic memory with statistical learning. *Talk delivered at the BCBL Conference on Interdisciplinary Advances in Statistical Learning, Bilbao, Spain.*

Schapiro, A.C., McDevitt, E.A., Mednick, S.C., Rogers, T.T., Norman, K.A. (2017, May). Enhancement and prioritization of structured information over sleep and wake. *Talk delivered at the Context and Episodic Memory Symposium, Philadelphia.*

Schapiro, A.C. (2017, September). Learning and consolidation of structured information. *Talk delivered at the Memory Disorders Research Society meeting, Chicago.*

Schapiro, A.C., Turk-Browne, N.B., Botvinick, M.M., & Norman, K.A. (2016, August). Complementary learning systems within the hippocampus. *Talk delivered at the 15th Neural Computation and Psychology Workshop, Philadelphia.*

Schapiro, A.C., Rogers, T.T., McDevitt, E.A., Mednick, S.C., & Norman, K.A. (2015, May). Human hippocampal replay prioritizes weakly-learned information and predicts memory performance. *Data blitz delivered at the Manhattan Area Memory Meeting, Princeton.*

Schlichting, M.L., Guarino, K.F., **Schapiro, A.C.,** Turk-Browne, N.B., & Preston, A.R. (2015, April). Structural development of hippocampal subfields is related to statistical learning and inference. *Talk delivered at the Austin Conference on Learning and Memory biannual meeting, Austin.*

Schapiro, A.C., Norman, K.A., Turk-Browne, N.B., & Botvinick, M.M. (2014, November). Rapid learning of complex temporal regularities in the hippocampus: Evidence from fMRI and a neural network model. *Talk delivered at the Society for Neuroscience Meeting, Washington, D.C.*

Schapiro, A.C., Norman, K.A., Turk-Browne, N.B., & Botvinick, M.M. (2014, June). Rapid learning of complex events in the hippocampus: Evidence from fMRI and neural network modeling. *Talk delivered at the Manhattan Area Memory Meeting, New York City.*

Schapiro, A.C., Gregory, E., Landau, B., McCloskey, M., Turk-Browne, N.B. (2013, May). The necessity of the medial temporal lobe for statistical learning. *Data blitz delivered at the Context and Episodic Memory Symposium, Philadelphia.*

Schapiro, A.C., Rogers, T.T, Cordova, N.I., Turk-Browne, N.B., &. Botvinick, M.M. (2012, July). Neural representations of events arise from temporal 'community' structure. *Talk delivered at the Neural Computation and Psychology Workshop, San Sebastian, Spain.*

Botvinick, M.M, **Schapiro, A.C.**, Cordova, N.I., Turk-Browne, N.B., & Rogers, T.T. (2012, April). Events as categories. *Talk delivered at the Cognitive Neuroscience Society Meeting, Chicago.*

Schapiro, A.C., Kustner, L.V., & Turk-Browne, N.B. (2011, November). Multi-voxel object representations in the human medial temporal lobe are shaped by incidental learning of temporal regularities. *Talk delivered at the Society for Neuroscience meeting, Washington, D.C.*

Schapiro, A.C., McClelland, J.L., Welbourne, S.R., Rogers, T.T., & Lambon Ralph, M.A. (2009, November). A computational account of the differences between unilateral and bilateral damage. *Talk delivered and poster presented at the Computational Cognitive Neuroscience Conference, Boston.*

Conference posters

Schapiro, A.C., Reid, A.G., Morgan, A., Manoach, D.S., Verfaellie, M., & Stickgold, R. Hippocampal contributions to sleep-dependent consolidation of non-hippocampal motor sequence learning. *Poster presented at the Society for Neuroscience Meeting, San Diego.*

Pudhiyidath, A., **Schapiro, A.C.,** Molitor, R.J., & Preston, A.R. Hippocampal representations of temporal statistics predict subsequent reasoning. *Poster presented at the Society for Neuroscience Meeting, San Diego.*

Schapiro, A.C., Bayda, M., Cho, E., Cox, R., & Stickgold, R. (2018, June). Generalization in an object category learning paradigm is better in the morning than the evening. *Poster presented at SLEEP, Baltimore.*

Schapiro, A.C., Bayda, M., Cho, E., Cox, R., & Stickgold, R. (2018, March). Generalization in an object category learning paradigm is better in the morning than the evening. *Poster presented at the Cognitive Neuroscience Society Meeting, Boston.*

Pudhiyidath, A., **Schapiro, A.C.,** Preston, A.R. (2018, March). Neural representations of temporal statistics can predict subsequent reasoning. *Poster presented at the Cognitive Neuroscience Society Meeting, Boston.*

Schapiro, A.C., Bayda, M., Cho, E., Cox, R., & Stickgold, R. (2017, November). The role of sleep in generalizing across disjointly presented information. *Poster presented at the Society for Neuroscience Meeting, Washington, D.C.*

Cox, R., Van Bronkhorst, M., Gomillion, H., **Schapiro, A.C.**, & Stickgold, R. (2017, November). Sleep selectively enhances associative aspects of emotional memories. *Poster presented at the Society for Neuroscience Meeting, Washington, D.C.*

Cohen, J.D., Lesnick, M., Keller, B., Baldassano, C., **Schapiro, A.C.,** & Ellis, C.T. (2017, November). Using realistic, synthetic fMRI data to validate Topological Data Analysis as a tool for fMRI. *Poster presented at the Society for Neuroscience Meeting, Washington, D.C.*

Cox, R., **Schapiro, A.C.,** & Stickgold, R. (2017, June). Oscillatory network dynamics of non-rapid eye movement sleep. *Poster presented at Network Neuroscience, Indianapolis.*

Schapiro, A.C., McDevitt, E.A., Chen, L., Norman, K.A., Mednick, S.C., & Rogers, T.T. (2017, June). Sleep benefits memory for semantic category structure while preserving individual exemplars. *Poster presented at SLEEP, Boston.*

Cox, R., van Bronkhorst, M., Gomillion, H., **Schapiro, A.C.**, Stickgold, R. (2017, June). Sleep selectively enhances associative aspects of emotional memories. *Poster presented at SLEEP, Boston.*

Schapiro, A.C., Turk-Browne, N.B., Botvinick, M.M., & Norman, K.A. (2016, November). Complementary learning systems within the hippocampus: A neural network modeling approach to reconciling episodic memory and statistical learning. *Poster presented at the Society for Neuroscience Meeting, San Diego.*

Schapiro, A.C., Rogers, T.T., McDevitt, E.A., Mednick, S.C., & Norman, K.A. (2016, June). Human hippocampal replay prioritizes weakly-learned information and predicts memory performance. *Poster presented at SLEEP, Denver.*

Schapiro, A.C., Rogers, T.T., McDevitt, E.A., Mednick, S.C., & Norman, K.A. (2015, October). Human hippocampal replay prioritizes weakly-learned information and predicts memory performance. *Poster presented at the Society for Neuroscience Meeting, Chicago.*

Guarino, K.F., Schlichting, M.L., **Schapiro, A.C.,** Turk-Browne, N.B., & Preston, A.R. (2015, October). Development of medial prefrontal cortex is related to statistical learning and inference. *Poster presented at the Society for Neuroscience Meeting, Chicago.*

Schlichting, M.L., Guarino, K.F., **Schapiro, A.C.,** Turk-Browne, N.B., & Preston, A.R. (2014, November). Structural development of hippocampal subfields is related to statistical learning and inference. *Poster presented at the Society for Neuroscience Meeting, Washington, D.C.*

Schapiro, A.C., Norman, K.A., Turk-Browne, N.B., & Botvinick, M.M. (2014, May). Learning of complex event structure in the hippocampus. *Poster presented at the Context and Episodic Memory Symposium, Philadelphia.*

Schapiro, A.C., Gregory, E., Landau, B., McCloskey, M., Turk-Browne, N.B. (2013, November). The necessity of the medial temporal lobe for statistical learning. *Poster presented at Society for Neuroscience meeting, San Diego.*

Schapiro, A.C., Rogers, T.T., Norman, K.A., Chen, L., McDevitt, E.A., Mednick, S.C. (2013, June). The role of sleep in consolidating semantic knowledge. *Poster presented at SLEEP, Baltimore.*

Schapiro, A.C., Rogers, T.T., Norman, K.A., Chen, L., McDevitt, E.A., Mednick, S.C. (2013, May). The role of sleep in consolidating semantic knowledge. *Poster presented at the Vision Sciences Society Meeting, Naples, FL.*

Schapiro, A.C., Norman, K.A., & Rogers, T.T. (2012, October). The role of sleep in consolidating semantic knowledge. *Poster presented at the Society for Neuroscience meeting, New Orleans.*

Gershman, S.J., **Schapiro, A.C.,** Hupbach, A., & Norman, K.A. (2012, October). Neural context reinstatement predicts memory misattribution. *Poster presented at the Society for Neuroscience meeting, New Orleans.*

Diuk, C., Yee, D., Ribas-Fernandes, J., Cordova, N.I., **Schapiro, A.C.**, Niv, Y., & Botvinick, M.M. (2012, October). Divide and conquer: Task decomposition in humans. *Poster presented at the Society for Neuroscience meeting, New Orleans.*

Schapiro A., Herd, S., Trippe, A., O'Reilly, R., Rogers, T., & Norman, K. (2012, July). The computational mechanisms underlying learning during sleep. *Poster presented at the Neural Computation and Psychology Workshop, San Sebastian, Spain.*

Schapiro, A.C., Kustner, L.V., & Turk-Browne, N.B. (2011, May). Contributions of visual and temporal similarity to statistical learning. *Poster presented at the Vision Sciences Society Meeting, Naples, FL.*

Schapiro, A.C., Kustner, L.V., & Turk-Browne, N.B. (2011, May). Visual similarity affects statistical learning of temporal regularities: Evidence from familiarity, implicit biases, and MTL pattern correlations. *Poster presented at the Context and Episodic Memory Symposium, Philadelphia.*

Schapiro, A.C., Rogers, T.T., & Botvinick, M. (2010, August). The structure of event representations: behavioral, imaging, and computational investigations. *Poster presented at the Cognitive Science Society Conference, Portland.*

Schapiro, A.C., McClelland, J.L., Welbourne, S.R., & Lambon Ralph, M.A. (2009, March). Modeling lateralization of semantic knowledge in the anterior temporal lobes. *Poster presented at the Cognitive Neuroscience Society Meeting, San Francisco.*